

S/N 10/731,924

Page 2

CISCO-8385

AMENDMENT(S) TO THE CLAIMS:

The following listing of claims will replace all prior versions, and listings, of claims on the application. All claims are set forth below with one of the following annotations: (Original); (Currently amended); (Cancelled); (Withdrawn); (New); (Previously presented); or (Not entered):

1.-4. (Cancelled).

5. (Previously presented) A frequency synthesizer comprising:

a phase locked loop including

a signal controlled oscillator (SCO),

a programmable frequency divider for dividing a signal from the SCO,

a first controller to provide the divide ratio to said programmable divider,

a reference source,

a phase detector for comparing a signal from said reference source with an output signal of said divider and generating a phase detector signal related to the phase difference therebetween, and

a loop filter for filtering the phase detector signal and providing a SCO control signal for controlling the frequency of said SCO;

a frequency range controller coupled to the SCO that includes switchable elements, each providing a different frequency range of operation of the SCO under control of a switch input;

a calibrator to relate the switch input to frequency ranges;

a sensor coupled to the control signal of the SCO providing a measurement that varies as the magnitude of the control signal, said sensor having more than two output values that vary as the magnitude of the control signal; and

a second controller accepting the magnitude indication and having an output coupled to the switch input of the range controller to maintain the operating point of the SCO close to a desired operating point.

6.-12. (Cancelled).

13. (Previously presented) A frequency synthesizer comprising:

a phase locked loop including

S/N 10/731,924

Page 3

CISCO-8385

a signal controlled oscillator (SCO),
means for dividing the frequency of a signal from the SCO,
first control means for providing the divide ratio to said
means for dividing,
means for providing a reference source,
means for comparing a signal from said reference source
with an output signal of said means for dividing and for generating a
phase detector signal related to the phase difference therebetween,
and
means for filtering the phase detector signal and providing a
SCO control signal for controlling the frequency of said SCO;
means for controlling a frequency range, the frequency range
controlling means coupled to the SCO that includes switchable elements,
each providing a different frequency range of operation of the SCO under
control of a switch input;
means for calibrating by relating the switch input to frequency
ranges;
means for sensing coupled to the control signal of the SCO , the
means for sensing providing an output of more than two values that vary as
the magnitude of the control signal; and
means for maintaining operating point of the SCO close to a desired
operating point, the means for maintaining accepting the output of the
means for sensing and having an output coupled to the switch input of the
frequency range controlling means.

14.-17. (Cancelled).

18. (Previously presented) An apparatus to maintain a voltage-controlled oscillator (VCO) close to a desired operating point, the voltage-controlled oscillator (VCO) providing a variable frequency output that depends, in part on an analog control input signal, and in part on a capacitance connected to a capacitor input, the apparatus comprising:
a switchable bank of capacitors connected to said capacitor input and having a switch input to provide a selectable range of operating frequencies for the VCO;
a sensor connected to the control input of the VCO providing a measurement that varies as the magnitude of the control signal, the sensor providing an analog output; and
a digital controller connected to the switch input and accepting the control signal magnitude indication, the controller accepting a digital input and providing control to

S/N 10/731,924

Page 4

CISCO-8385

the switchable capacitor bank to maintain the operating point of the VCO close to the desirable operating point;

a temperature sensor to provide an indication of temperature to the digital controller; and

an analog to digital converter (ADC) to convert the analog sensor output to the magnitude indication accepted by the digital controller,

wherein the digital controller detects when the temperature changes by more than a temperature threshold and generates the control to the switchable capacitor bank when the temperature threshold is exceeded.

19. (Currently amended) An apparatus as recited in claim 1 to maintain a voltage-controlled oscillator (VCO) close to a desired operating point, the voltage-controlled oscillator (VCO) providing a variable frequency output that depends, in part on an analog control input signal, and in part on a capacitance connected to a capacitor input, the apparatus comprising:

a switchable bank of capacitors connected to said capacitor input and having a switch input to provide a selectable range of operating frequencies for the VCO;

a sensor connected to the control input of the VCO providing a measurement that varies as the magnitude of the control signal, said sensor having more than two output values that vary as the magnitude of the control signal; and

a controller connected to the switch input and accepting the control signal magnitude indication, the controller providing control to the switchable capacitor bank to maintain the operating point of the VCO close to the desirable operating point,

wherein said sensor includes a sense amplifier coupled to an analog to digital converter to provide a multi-bit digital signal.